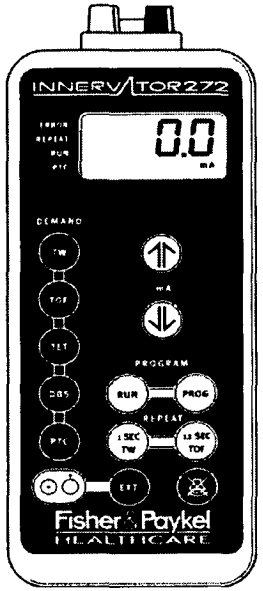
INNERVATOR272

Constant Current Peripheral Nerve Stimulator & Locator

REF 185042351 Rev F

OPERATING INSTRUCTIONS

English



The NS272 Peripheral Nerve Stimulator and Locator provide nerve location for regional anesthesia and monitoring of neuromuscular block for general anesthesia.

OPERATOR CONTROL BUTTONS

A. *ON/OFF, POWER, MUTE BUTTONS*

Switches the INNERVATOR272 on & off.

EXT

Switches the INNERVATOR272 on in external mode **when pressed and held simultaneously with ON/OFF switch.**

Sets the amount of current to be delivered by 10mA steps in external or 0.2mA in internal. Maximum set current is 160mA, (To deliver 80 - 160 mA (external) or 0.2 - 10mA (internal) see Programming Features)

Mutes audible pulse delivery sound. To cancel press again. **Cannot be used to mute the audio alarm sound.**

B. *DEMAND BUTTONS*

TW
Delivers a single pulse.

TOF, (External Mode Only)
Delivers a train of four pulses where each pulse is 0.5 seconds apart

TET, (External Mode Only)
Delivers a 5 second tetanus pulse train. After activating the TET button a 5 minute safety lockout prevents access to the PTC button.

DBS, (External Mode Only)
Delivers a Double Burst pulse train. DBS = three pulses 20 ms, a 750 ms lull then two **OR** three 20ms pulses, (see programming features).

PTC, (External Mode Only)
Post Tetantic Count. Consists of five sec TET pulse, three sec pause, twenty twitch pulses at 1 Hz. For safety, PTC can only be activated once every five minutes.

1. *REPEAT BUTTONS*

1 SEC TW, (1 Second Twitch (1Hz))
Single pulse delivered at one second intervals.

12 SEC TOF, (12 Second Train-of Four)
Train of four pulses repeated every 12 seconds.

2. *PROGRAM BUTTONS*

PROG
Activates programming capabilities. Press once to change settings, twice to store program.

RUN
Starts stored program, press again to stop. Default program = 10sec twitch.

VISUAL INDICATORS

INTERNAL/EXTERNAL MODE **EXTERNAL INTERNAL**
The appropriate word will be displayed indicating current mode of operation.

CURRENT **mA**
Current delivered to the patient, shown in milliamps.

PULSE DELIVERY ⊙
Shown as a solid dot in the center of a circle. It flashes every time a pulse is delivered.

MUTE
Indicates that audible pulse signal is muted.

PROGRAM **P**
Indicates INNERVATOR272 is in programming mode

RUN **RUN** ◀
Indicates that the stored program is running.

PTC **PTC** ◀
Flashes to indicate that PTC, Post Tetanic Count pattern is running **OR** continuous display if safety lockout is still in effect.

REPEAT **REPEAT** ◀
Indicates that one of the three repeat pulse patterns, 1SEC TW, 12 SEC TOF or 10 SEC TW (RUN) is running.

ERROR **ERROR** ◀
Indicates that the INNERVATOR272 is not able to deliver the specified current. Indicates excessive impedance, or disconnected leads or dry patient electrodes.

LOW BATTERY
Indicates that the batteries require replacing as soon as possible.

AUDIO INDICATORS

PULSE DELIVERY
Monotone, single beep with every pulse.

AUDIBLE ALARM (EXTERNAL MODE)
Half second, monotone beep each time pulse is delivered incorrectly AND, at the completion of the pulse train there is a 2 second continuous beep. Indicates pulse does not fall within the tolerance limits each side of the set current. May be caused by, excessive impedance, disconnected leads or dry patient electrodes. *If the alarm sound is occurring repeatedly:*

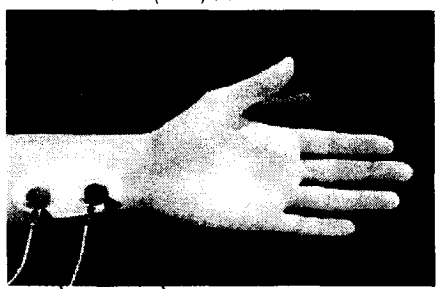
- Do not continue running a repeat function.
- Do not deliver any further pulses until the fault causing the condition is repaired.

USE & CONNECTION TO A PATIENT

A. *EXTERNAL MODE (Peripheral nerve stimulation)*

Only shrouded lead sets (200NS033 (supplied), 200NS032, 200NS031 or 200NS037) may be used with INNERVATOR272.

1. Ensure that the INNERVATOR272 is switched OFF.
2. Connect external lead to the INNERVATOR272, proximal (red, positive) to red socket and distal (black, negative), to black socket.
3. Connect the other end of the lead to the patient electrodes 200NS003, usually attached along the ulnar nerve. Proximal (red) connector to proximal (red) electrode, distal, (black), connector to distal (black) electrode.



4. ***Following the induction of anesthesia,*** switch unit on by pressing and holding ON/OFF **and** EXT buttons simultaneously. Increase the current until desired level of supramaximal stimulation has been attained.
5. Select desired pulse pattern using the appropriate buttons:

- *DEMAND BUTTONS - Activates pulse pattern ONCE ONLY.*
- *REPEAT BUTTONS - Activates a repetitive pulse pattern. Press again to switch pattern off.*
- *PROGRAM BUTTONS - Press to store and execute program or change Program settings.*
- *PTC button cannot be used when storing a program.*

NOTE: A two second continuous tone indicates that alarm conditions exist. This may be caused by excessive impedance, dried or faulty electrode(s), or disconnected or faulty leads.

6. After use, always ensure that the INNERVATOR272 is switched OFF.

B. *INTERNAL MODE (Nerve location)*

Only shrouded lead sets (200NS036 (supplied), 200NS035 or 200NS034) may be used with the INNERVATOR272.

1. Connect the internal locator lead to the unit
2. Connect RED clip on patient end of lead to an electrode placed proximal to the site to be anesthetized. Connect black clip or pin to the needle.
3. Switch the INNERVATOR272 into internal mode using the ON/OFF button.
4. Select desired current and stimulus pattern using the TW, 1SEC TW or RUN (activates a stored program).
5. Advance the needle through skin. An audible tone and removal of the error indicator confirms leads are connected and a stimulus is administered.
6. After use, always ensure that the INNERVATOR272 is switched OFF.

Auto power shut-off after 30 minutes of non-use.

INNERVATOR272 will emit three beeps, if no buttons are pressed within next minute, INNERVATOR272 will automatically switch off. Press any button to cancel the automatic shut down for another 30 minutes.
Will not occur if running a repeat function.

HOW TO PROGRAM

A. *PROGRAMMING A PULSE PATTERN*

1. In internal mode push PROG button once. In external mode push PROG button twice. Display will read 00P indicating a program can be stored.
2. Use DEMAND BUTTONS* ONLY to deliver desired pulse pattern or timings. Any number may be pressed in any order. ~60 pulses max.

Only TW can be used in internal mode. To set beyond 5mA, the CURRENT UP button must be pressed and released each time a further increment of 1mA is desired.

3. Allow desired time interval between pulses to elapse between button pushes, e.g. 2 per second (the display will count upwards in seconds). Each time a demand button is pressed the display returns to zero. Maximum elapsed time between button pushes is 199 seconds.
4. Push PROG again to store the program.
5. Reset the INNERVATOR272 to the desired current delivery level, (current is automatically zeroed during programming).
6. Push RUN to execute the stored program at set output current. The RUN indicator will be displayed while program is running.

* *PTC button cannot be used when storing a program.*

B. *PROGRAMMING CURRENT INCREMENTS TO 5mA or 10mA (EXTERNAL MODE ONLY).*

1. Push PROG button ONCE, (display will read P).
2. Push the CURRENT DOWN button to select the desired increment setting

C. *PROGRAMMING TETANUS PULSE TO 50HZ OR 100HZ (EXTERNAL MODE ONLY).*

1. Push PROG button ONCE, (display will read P).
2. Cycle the TET button to select Tetanus frequency. The frequency will be displayed as "50" or "100".

NOTE: There is no visual indicator to display TET frequency when in use. However the 100Hz audio indicator is a faster pulse delivery sound than the 50Hz.

D. *PROGRAMMING THE MAXIMUM CURRENT SETTING TO 80mA OR 160mA (EXTERNAL MODE ONLY).*

1. Push PROG button ONCE, (display will read P).
2. Push CURRENT UP button to select maximum current at 80mA. "Lo" will be displayed to indicate the maximum current is 80mA. Pressing the CURRENT UP button again will select the maximum current at 160mA and "Hi" will be displayed. If 80mA is programed, depressing the CURRENT UP button will increase the current in 10mA steps to 80mA. If 160mA is programed, depressing the CURRENT UP button will increase the current in 10mA steps to 80mA. To set beyond 80mA, the CURRENT UP button **must be pressed and released** each time a further increment of 10mA is desired.

E. *PROGRAMMING THE DOUBLE BURST STIMULATION PATTERN (EXTERNAL MODE ONLY).*

1. Push PROG button ONCE, (display will read P).
2. Push the DBS button to select either the 3:2 or 3:3 pattern. The display will indicate either "3:2" or "3:3".

F. *IMPORTANT NOTES:*

- All programs are retained when unit is switched off.
- Programs are retained for 5 minutes when batteries are removed to allow sufficient time for battery replacement. If batteries removed for longer than 5 minutes, program features return to default, (see specifications).

DEFINITIONS

Type BF Applied Part

ATTENTION Consult accompanying documents

CE 0123

93/42/EEC Class IIb

'PERIPHERAL NERVE STIMULATOR/LOCATOR' CLASSIFIED BY UNDERWRITERS LABORATORIES INC WITH RESPECT TO ELECTRIC SHOCK, FIRE, MECHANICAL HAZARDS ONLY IN ACCORDANCE WITH UL 2601-1, CAN/CSA C22.2 NO. 601.1 84DJ

WARNING: A WARNING statement refers to the conditions when the possibility of injury to the patient or user exists if a procedure is not followed correctly.
CAUTION: A Caution statement indicates the possibility of damage to the equipment exists if a procedure is not followed correctly.
NOTE: A Note statement provides additional information intended to clarify points, procedures or instructions.

WARNING:

- *This device should not be used in a manner that allows trans-thoracic stimulation.*
- *Use recommended lead sets only . Only shielded nerve location needles should be used.*
- *Dangerous voltages may exist within this device for up to ten minutes after removal of the batteries.*
- *This device is not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide.*
- *This product is intended for use by qualified medical practitioners and such persons should ensure that they are totally familiar with the use of the nerve stimulator/locator before using the device.*

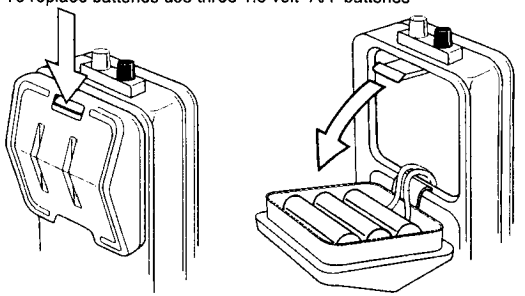
CAUTION:

Interference from electrocautery units (diathermy), may be experienced. Ensure that the Nerve Stimulator is positioned away from electrocautery unit. Lead-set should not run parallel to the electrocautery lead and should not cross the electrocautery lead at any stage.

Remove batteries if equipment is not likely to be used for some time. All maintenance must be carried out by qualified personnel. Clean the case and leadsets with one of the following disinfectants: Isopropyl Alcohol, Dy-Gest™, Cidex™ OPA, Sporicidin™. For further information and technical data contact your Fisher & Paykel Healthcare dealer.

BATTERY REPLACEMENT

To replace batteries use three 1.5 volt "AA" batteries



SPECIFICATIONS

OUTPUT CURRENT RANGE
- In External Mode 0-160 mA selectable in 5 or 10mA steps. In Internal Mode 1-10mA at increments of 0.2mA between 0.0 and 2.0mA, 0.5mA between 2.0 and 5.0mA and 1.0mA between 5.0 and 10.0mA.

TETANUS FREQUENCY
- Programmable 50Hz or 100Hz

OUTPUT PULSE FORM
- Square wave, constant current, monophasic, unidirectional

OUTPUT PULSE WIDTH
- 195 microseconds ± 5μs

OUTPUT PULSE RISE/FALL TIME
- < 10 microseconds maximum (resistive load)

OUTPUT VOLTAGE
- **External** 350V ± 10%, max output voltage
  420V ± 10%, max internal voltage
- **Internal** 10V ± 10%, max output voltage
  15V ± 10%, max internal voltage

MAXIMUM LOAD IMPEDANCE
- **External**
  TW, TOF, TET, DBS, PTC - 4K ohms at 80mA, 1.8K ohms at 160mA
- **Internal**
  TW - 1K ohm at 10mA

SET CURRENT OFFSET
- **External**
  at 0-80mA ± 2.5mA
  at 85-160mA ± 5.0mA
- **Internal**
  at 0-2mA ± 0.15mA
  at 2.5-10mA ± 0.3mA

ALARM TOLERANCE LIMITS
- **External**
  ± 2.5mA of the set current
- **Internal**
  ± 0.1mA of the set current

DEFAULT PROGRAM
- 10sec twitch

DEFAULT PROGRAM SETTINGS (EXTERNAL ONLY)
- TET = 50Hz, Current Max = 80mA, Current steps 10mA, DBS = 3:3

POWER REQUIREMENT
- Internally powered. Three 1.5 volt "AA" batteries

BATTERY LIFE
- More than 160 hours continuous use with alkaline batteries

DIMENSIONS
- Height - 175mm / 6.9"
- Width - 73mm / 2.9"
- Depth - 43mm / 1.7"
- Weight - 0.18kg / 6.3oz, (without batteries)

EXTERNAL LEAD SETS
- 200NS033 (supplied): dome connectors.
- 200NS032: pin connectors.
- 200NS031: alligator clips.
- 200NS037: alligator clips 2m.

All external leadsets are electrocautery resistant

INTERNAL LEAD SETS
- 200NS036 (supplied): dome clip/pin connector.
- 200NS035: alligator clip/pin connector.
- 200NS034: alligator clip/dome connector.

ENVIRONMENTAL

	Operation	*Transport*	*Storage*
Temperature	0°C to 35°C	-25°C to 40°C	-25°C to 40°C
Humidity	0 % to 65 %	0 % to 85 %	0 % to 85 %

'Ordinary equipment'

CONTACTS

INTERNATIONAL P O Box 14 348, Panmure, Auckland 6, New Zealand Tel:+64 9 574 0100 Fax:+64 9 574 0158 Email: innervator@fphcare.co.nz Web Site: www.fphcare.com **USA** Tel: 1800 446 3908 or +1 949 470 3900 Fax:+1 949 470 3933 **AUSTRALIA** Tel:+61 3 9879 5022 Fax:+61 3 9879 5232 **AUSTRIA** Tel: 0800 29 31 23 Fax: 0800 29 31 22 **BENELUX** Tel: +31 78 644 0924 Fax: +31 78 644 0914 **FRANCE** Tel:+33 1 6446 5201 Fax:+33 1 6446 5221 **GERMANY** Tel: +49 7182 93777 0 Fax: +49 7182 93777 99 **IRISH REPUBLIC** Tel: 1800 409 011 **ITALY** Tel:+39 06 7839 2939 Fax:+39 06 7814 7709 **SPAIN** Tel:+34 902 013 346 Fax:+34 902 013 379 **UK** (EU Authorised Representative) Tel:+44 1628 626 136 Fax:+44 1628 626 146 **Nthn Ireland** Tel: 0800 132 189

Caution: US Federal law restricts this device to sale by, or on the order of, a physician.

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